Docket No.: 126533-1
(PATENT)

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Application of:	)	
RICHARD SCOTT BOURGEOIS et al.	)	Group Art Unit 1745
	)	Confirmation No. 9731
Serial No. 10/816,697	)	
	)	Examiner Tony Sheng Hsiang Chuo
Filed: April 5, 2004	)	
	)	
For: COMPLIANT FUEL CELL SYSTEM	)	Attorney Docket 126533-1
	)	

APPEAL BRIEF

MS Appeal Brief - Patents
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

Dear Sir:

As required under § 41.37(a), this brief is filed within two months of the Notice of Appeal filed in this case on April 8, 2009, and is in furtherance of said Notice of Appeal.

Table of Contents

This Appeal Brief contains items under the following headings as required by 37 C.F.R. § 41.37 and M.P.E.P. § 1205.02:

I. REAL PARTY IN INTEREST

The real party in interest for this Appeal is:

General Electric Company by way of an Assignment recorded at Reel/Frame 015179/0128 on April 5, 2004.

II. RELATED APPEALS AND INTERFERENCES

There are no other appeals, interferences, or judicial proceedings which will directly affect or be directly affected by or have a bearing on the Board's decision in this Appeal.

III. STATUS OF CLAIMS

A. Total Number of Claims in Application

There are 13 Claims pending in application.

B. Current Status of Claims

1. Claims canceled: 1-18, 25, 27-29, 36 and 37.
2. Claims withdrawn from consideration but not canceled: None.
3. Claims pending: 19-24, 26 and 30-35.
4. Claims allowed: None.
5. Claims rejected: 19-24, 26 and 30-35.

C. Claims On Appeal

The Claims on Appeal are Claims 19-24, 26 and 30-35.

IV. STATUS OF AMENDMENTS

No amendment to the Claims was filed subsequent to the final Office action dated January 15, 2009 (Paper No. 20090108). The status of the amendments to the Claims prior to the final Office action is as follows:

A. Responsive to a Restriction/Election Requirement dated July 13, 2006, Appellant elected Group II: Species 2, Claims 19-26 with traverse.

B. Responsive to a non-final Office action dated August 30, 2006, Appellant amended Claims 19 and 26, and added Claims 30-36 on December 22, 2006.

C. Responsive to a final Office action dated March 22, 2007, Appellant amended Claims 19, 26 and 31-36, and canceled Claim 37[1] on September 24, 2007.

D. Responsive to a non-final Office action dated October 1, 2007, Appellant amended Claims 19, 34 and 35, and canceled Claims 1-18, 27-29 and 36-37 as being drawn to a non-elected invention on December 20, 2007.

E. Responsive to a final Office action dated March 17, 2008 and an Advisory Action dated May 27, 2008, Appellant amended Claim 19 in a Request for Continued Examination filed on May 29, 2008.

F. Responsive to a non-final Office action dated August 13, 2008, Appellant amended Claims 19 and 20, and canceled Claim 25 on October 8, 2008.

G. Responsive to a final Office action dated January 15, 2009, Appellant filed a Request for Reconsideration on March 16, 2009.

H. Responsive to an Advisory Action dated March 31, 2009, Appellant timely filed a Notice of Appeal on April 8, 2009.

[1] Appellant notes that Claim 37 was never pending in this application, but was listed as pending on the Office Action Summary of the final Office action dated March 22, 2007.

V. SUMMARY OF CLAIMED SUBJECT MATTER

By way of background, a fuel cell produces electricity by catalyzing fuel and oxidant into ionized atomic hydrogen and oxygen at the anode and the cathode, respectively. The electrons removed from hydrogen in the ionization process at the anode are conducted to the cathode where they ionize the oxygen. In the case of a solid oxide fuel cell, the oxygen ions are conducted through the electrolyte where they combine with ionized hydrogen to form water as a waste product and complete the process. The electrolyte is otherwise impermeable to both fuel and oxidant and merely conducts oxygen ions. This series of electrochemical reactions is the sole means of generating electric power within the fuel cell. It is therefore desirable to reduce or eliminate any mixing of the reactants that result in a different combination such as combustion which does not produce electric power and therefore reduces the efficiency of the fuel cell. See *Paragraph [0003].*

The fuel cells are typically assembled in electrical series in a fuel cell stack to produce power at useful voltages. To create a fuel cell stack, an interconnecting member is used to connect the adjacent fuel cells together in electrical series. When the fuel cells are operated at high temperatures, such as between approximately 600 °C (Celsius) and 1000 °C, the fuel cells are subjected to mechanical and thermal loads that may create strain and resulting stress in the fuel cell stack. Typically in a fuel cell assembly, various elements in intimate contact with each other comprise different materials of construction, such as a metal and a ceramic. During the thermal cycles of the fuel cell assembly, elements expand and/or contract in different ways due to the difference in the coefficient of thermal expansion (CTE) of the materials of construction. In addition, individual elements may undergo expansion or contraction due to other phenomena, such as a change in the chemical state of one or more elements. This difference in dimensional expansion and/or contraction may affect the seal separating the oxidant and the fuel paths and also the bonding of the elements made of dissimilar materials. See *Paragraph [0004].*

Independent Claim 19 is directed to a fuel cell stack (54, 60) comprising a first fuel cell assembly (2) and a second fuel cell assembly (2) electrically coupled together. See *Figs. 6 and 7; Paragraphs [0036] and [0041].* Each fuel cell assembly (2) comprises a hollow manifold (16) comprising a top wall (18) and a bottom wall (20). See *Fig. 1; Paragraph [0021].* The hollow manifold includes a sealed fuel passage (10, 12) for allowing fuel to enter and exit the hollow manifold (16). See *Paragraph [0031].* The fuel cell stack further comprises a fuel cell

(36) comprising an anode (8), a cathode (4) and an electrolyte (6) disposed therebetween. See *Paragraphs [0021-0027], [0033] and [0041].* A portion of one of the top and bottom walls (18, 20) of the hollow manifold (16) forms a side wall in direct contact with the fuel cell such that the fuel cell (36) is coplanar with the hollow manifold (16). See *Fig. 1A; Paragraphs [0029] and [0030].* A portion of one of the top and bottom walls (18, 20) of the hollow manifold (16) extending between the fuel cell and the sealed fuel passage (10, 12) forms a compliant structure (26, 28) to accommodate thermal expansion of the fuel cell (36) in the same plane as the hollow manifold (16). See *Paragraphs [0021]-[0041].*

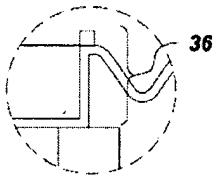

Fig. 1A

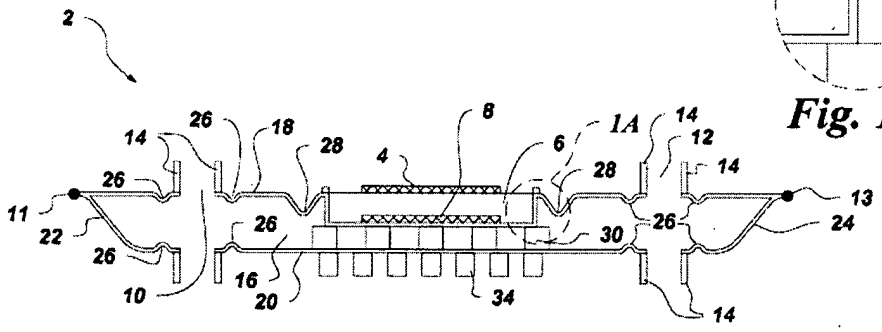

Fig. 1

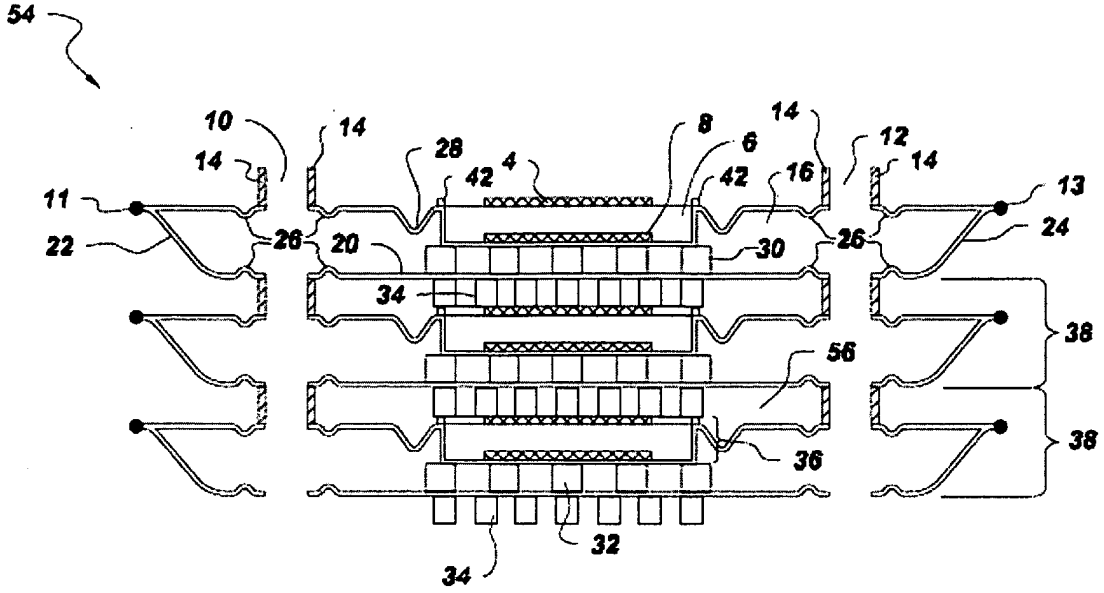
54
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Fig. 6

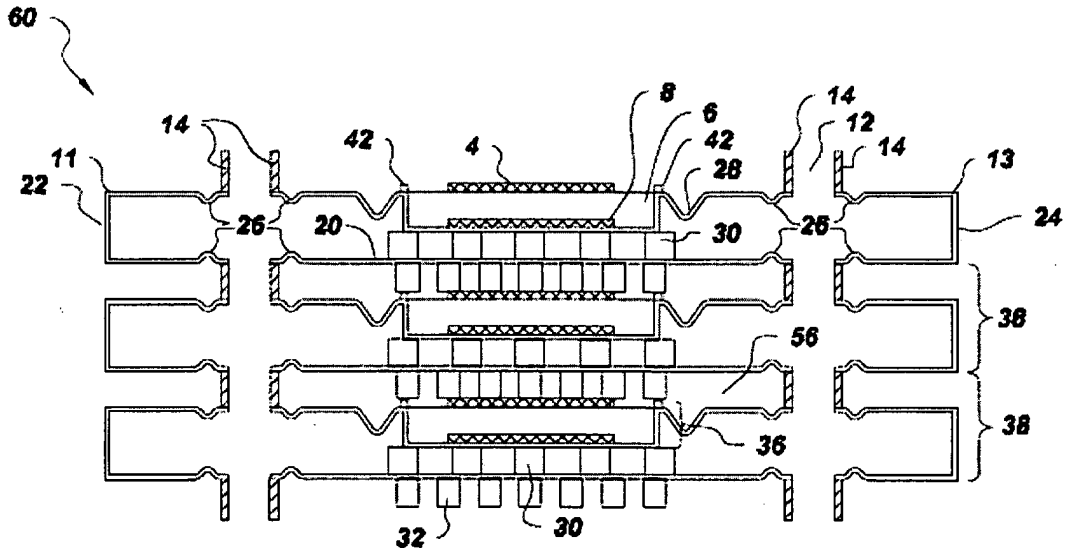
60
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Fig. 7

VI. GROUNDS OF REJECTION TO BE REVIEWED ON APPEAL

1. Whether Claims 19-24, 26 and 30-35 are unpatentable under 35 U.S.C. 102(b) over Donelson et al. (U.S. Patent No. 6,492,053, hereinafter "Donelson").

2. Whether Claims 21 and 22 are indefinite under 35 U.S.C. 112, Second Paragraph.

VII. ARGUMENT

1. Rejection of Claims 19-24, 26 and 30-35 under 35 U.S.C. §102(b) over Donelson

Independent Claim 19 specifies, *inter alia*, a fuel cell assembly (2) comprising a hollow manifold (16) comprising a top wall (18) and a bottom wall (20), said hollow manifold including a sealed fuel passage (10, 12) for allowing fuel to enter and exit said hollow manifold; and a fuel cell (36) comprising an anode (8), a cathode (4) and an electrolyte (6) disposed there between, a portion of one of said top and bottom walls (18, 20) of said hollow manifold forming a side wall (FIG. 1A) in direct contact with said fuel cell such that said fuel cell is coplanar with said hollow manifold, wherein a portion of one of the top and bottom walls (18, 20) of said hollow manifold extending between said fuel cell (36) and said sealed fuel passage (10, 12) forms a compliant structure (26, 28) to accommodate thermal expansion of said fuel cell in the same plane as said hollow manifold. The highlighted feature is illustrated in *Figs. 1 and 1A* below.

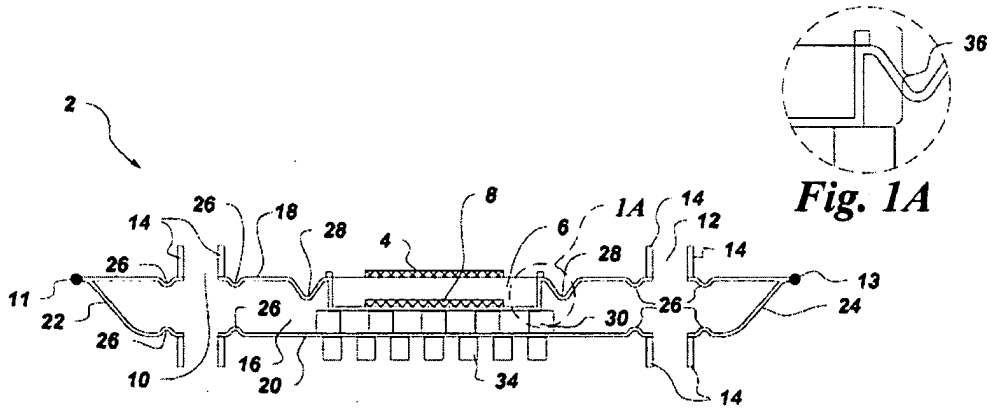

Fig. 1A

Fig. 1

Donelson discloses a planar fuel cell assembly (10) that includes a pair of interconnect plates (12, 14) with a single fuel cell (16) there between. The fuel cell (16) includes an anode (18), a thin cathode layer (22), and a thin electrolyte layer (20) there between. The interconnect plates (12, 14) are spaced apart by an insulating spacer plate (34) having an opening (36) for receiving the fuel cell (16). Because the insulating spacer plate 34 has a greater thickness than

the fuel cell (16), a compression member (32) is disposed between the interconnect plate (12) and the anode layer (18) of the fuel cell (16). The compression member (32) includes outer sheets (38, 40) and a corrugated inner sheet (42). The fuel cell assembly 10 also includes inlet manifolds (50, 54) and outlet manifolds (52, 56). The manifolds (50, 52) communicate with channels (28) in the interconnect plate by way of inlet and outlet passages (58, 60) and distributors (62, 64). See *Figs. 1 and 2* below.

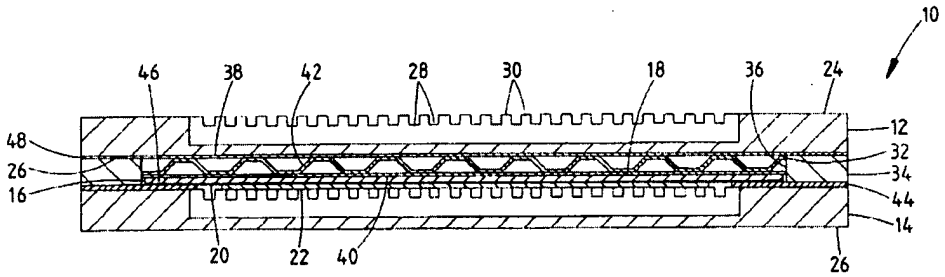

FIG 1

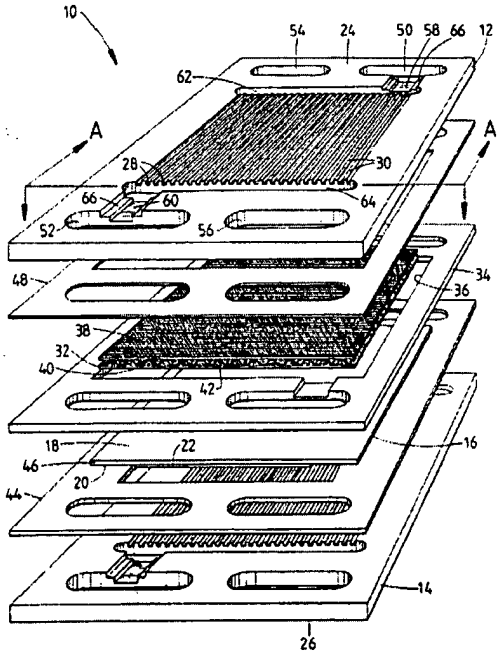

FIG 2

On *Page 3* of the final Office action, the Examiner states:

> "a portion of the top wall '34 of the top wall forms a side wall in direct contact with the fuel cell such that the fuel cell is coplanar with the hollow manifold and wherein a portion of the top wall '42 extending between the fuel cell and the sealed fuel passage forms a compliant structure that is capable of accommodating thermal expansion of the fuel cell in the same plane as the hollow manifold (See Figures 1 and 2 and column 5, line 45 to column 59)."

Applicant respectfully disagrees with this assertion.

In Donelson, a portion of the top wall extending between the fuel cell (indicated by the Examiner as element "16") and the sealed fuel passage (indicated by the Examiner as elements "54, 56") does not form a compliant structure (indicated by the Examiner as element "42") to accommodate thermal expansion of the fuel cell in the same plane as the hollow manifold. Rather, the compliant structure (indicated by the Examiner as element "42") extends between two outer sheets (38, 40) to form the compression member (32), which is not located between the manifold (54, 56) and the fuel cell (16), but rather parallel to the plane of the fuel cell. Thus, the compliant structure (indicated by the Examiner as element "42") does not accommodate for the differences in the thermal expansion coefficients in the same plane between the fuel cell and the manifold, as asserted by the Examiner.

A claim is anticipated only if each and every element as set forth in the claim is found, either expressly or inherently described in a single prior art reference. *See MPEP §2131.*

Contrary to the Office action that all of the elements of Claim 19 are disclosed in Donelson, a fuel cell assembly in which at least the feature of a portion of one of the top and bottom walls of a hollow manifold extending between a fuel cell and a sealed fuel passage forms a compliant structure to accommodate thermal expansion of the fuel cell in the same plane as the hollow manifold, is not disclosed, taught or suggested in Donelson, so the rejection is unsupported by the art and should be withdrawn.

Further, it would not have been obvious to modify the fuel cell assembly (10) of Donelson to meet the claimed invention. In Donelson, the purpose of the corrugated inner sheet (42) is to facilitate fuel gas flow across the chamber defined by the opening (36) and to give the

compression member (32) a degree of compressibility between the interconnect plate (12) and the fuel cell (16). See *col. 6, lines 63-col. 7, line 10.*

On the other hand, the compliant structure of the invention accommodates the difference between the thermal expansion coefficients of the fuel cell and the manifold that are typically made of different materials. To this end, the fuel cell, the compliant structure and the manifold a substantially coplanar with each other, unlike the Donelson fuel cell assembly that can only move in the plane perpendicular to the fuel cell. Thus, one skilled in the art would not look to Donelson and be motivated to modify Donelson to meet the claimed invention.

On *Page 2* of the Advisory Action dated March 31, 2009, the Examiner asserts:

> "[i]n response, the fact that the element '42' may be parallel to the fuel cell does not negate the fact that it can also be located between the fuel cell '16' and the manifold '56'. As shown in Figure 2, the compliant portion '42' extends between the fuel cell '16' and the sealed fuel passage '56' formed by plate '34' because the compliant portion '42' contacts both the fuel cell '16' and the plate '34'. In addition, the corrugated structure of element '42' is capable of accommodating for differences in the thermal expansion coefficients in the same plane as the hollow manifold as claimed because the structure of element '42' can extend in the same (horizontal) plane as the fuel cell."

Appellant respectfully disagrees with these assertions. First, independent Claim 19 requires 1) a portion of one of the top and bottom walls (18, 20) of the hollow manifold (16) forms a side wall in direct contact with the fuel cell such that the fuel cell is coplanar with the hollow manifold, and 2) a portion of one of the top and bottom walls (18, 20) of the hollow manifold (16) extending between said fuel cell (36) and said sealed fuel passage (10, 12) forms a compliant structure (26, 28) to accommodate thermal expansion of said fuel cell in the same plane as said hollow manifold.

By contrast, it is unknown to the Appellant what could be considered the top and bottom walls of the "manifold" 56 of Donelson, and there is no mention by the Examiner of the top and bottom wall of the "manifold" 56. In addition, the "compliant portion" 42 of Donelson is part of a compression member 32 that is positioned between the interconnect plate 12 and the anode layer 18 of the fuel cell 16 within the chamber defined by the opening 36 of the spacer 34. The "compliant portion" 42 is not located between the fuel cell 16 and the "manifold" 56 of Donelson, but rather directly on top of the fuel cell 16, as clearly seen in Fig. 1. Thus, it is physically impossible for Donelson to satisfy both the above-mentioned requirements of Claim 19.

Second, the "compliant portion" 42 does not accommodate thermal expansion of the fuel cell 16 in the same plane as the "manifold" 56 in Donelson. Donelson teaches that the purpose of the plate 34 is to provide electrical insulation between interconnect plates 12 and 14, not thermal expansion. In addition, Donelson teaches that the plate 34 works in conjunction with a compression member 32 to apply pressure to the fuel cell 16 to maintain the cathode layer 22 in electrical contact with the cathode side 24 of the interconnect plate 14. See *col. 6, line 33-56.* Even if, *arguendo*, the compression member 32 of Donelson can be considered to accommodate thermal expansion of the fuel cell 16, any accommodation of thermal expansion would be in a plane perpendicular to the fuel cell and the manifold, not in the same plane as the fuel cell and the manifold.

In view of the foregoing, the rejection of Claims 19-24, 26 and 30-35 under 35 U.S.C. §102(b) over Donelson should be reversed.

2. Rejection of Claims 21 and 22 under 35 U.S.C. §112, Second Paragraph

Claims 21 and 22 depend from Claim 19. Dependent Claims 21 and 22 recite the feature of "at least one hollow manifold", whereas independent Claim 19 recites the feature of "a hollow manifold."

According to *MPEP §2171*, there are two separate requirements set forth in 35 U.S.C. 112 second paragraph:

(A) the claims must set forth the subject matter that applicants regard as their invention; and

(B) the claims must particularly point out and distinctly define the metes and bounds of the subject matter that will be protected by the patent grant.

The first requirement is a subjective one because it is dependent on what the applicants for a patent regard as their invention. The second requirement is an objective one because it is not dependent on the views of applicant or any particular individual, but is evaluated in the context of whether the claim is definite, i.e., whether the scope of the claim is clear to a hypothetical person possessing the ordinary level of skill in the pertinent art.

According to *MPEP §2173*, the essential inquiry pertaining to satisfying the requirements of 35 U.S.C. 112, second paragraph is whether the claims set out and circumscribe a particular subject matter with a reasonable degree of clarity and particularity. Definiteness of claim language must be analyzed, not in a vacuum, but in light of:

(A) The content of the particular application disclosure;

(B) The teachings of the prior art; and

(C) The claim interpretation that would be given by one possessing the ordinary level of skill in the pertinent art at the time the invention was made.

In reviewing a claim for compliance with 35 U.S.C. 112, second paragraph, the Examiner must consider the claim as a whole to determine whether the claim apprises one of ordinary skill in the art of its scope and, therefore, serves the notice function required by 35 U.S.C. 112, second paragraph, by providing clear warning to others as to what constitutes infringement of the patent. *Solomon v. Kimberly-Clark Corp.*, 216 F.3d 1372, 1379, 55 USPQ2d 1279, 1283 (Fed. Cir. 2000).

Appellant agrees that the phrase "at least one hollow manifold" recited in Claims 21 and 22 is not identical to the phrase "hollow manifold" recited in Claim 19. However, Appellant asserts that one skilled in the art would clearly understand that the "at least one hollow manifold" recited in Claims 21 and 22 pertains to the "hollow manifold" recited in Claim 19. Thus, Appellant asserts that dependent Claims 21 and 22 satisfy the requirements of 35 U.S.C. 112, second paragraph, so the Examiner's rejection of Claims 21 and 22 under 35 U.S.C. 112, second paragraph should be withdrawn.

In view of the foregoing, Appellant respectfully submits that the application is in condition for allowance. Favorable consideration and prompt allowance of the application is earnestly solicited.

Dated: June 5, 2009

Respectfully submitted,

By /Peter J. Rashid/

Peter J. Rashid, Reg. No. 39464

VIII. CLAIMS APPENDIX

19. A fuel cell stack comprising:

a first fuel cell assembly and a second fuel cell assembly electrically coupled together, each fuel cell assembly comprising:

a hollow manifold comprising a top wall and a bottom wall, said hollow manifold including a sealed fuel passage for allowing fuel to enter and exit said hollow manifold; and

a fuel cell comprising an anode, a cathode and an electrolyte disposed there between, a portion of one of said top and bottom walls of said hollow manifold forming a side wall in direct contact with said fuel cell such that said fuel cell is coplanar with said hollow manifold;

wherein a portion of one of the top and bottom walls of said hollow manifold extending between said fuel cell and said sealed fuel passage forms a compliant structure to accommodate thermal expansion of said fuel cell in the same plane as said hollow manifold.

20. The fuel cell stack accordingly to claim 19 further comprising a cathode flow channel coupled to said hollow manifold of said first fuel cell assembly and said second fuel cell assembly, said cathode flow channel configured for directing an oxidant between said first fuel cell assembly and said second fuel cell assembly.

21. The fuel cell stack in accordance with claim 19, wherein said at least one hollow manifold for said first fuel cell assembly and said second fuel cell assembly is substantially rectangular.

22. The fuel cell stack in accordance with claim 19, wherein said at least one hollow manifold of said first fuel cell assembly and said second fuel cell assembly further comprises an electrically conductive material.

23. The fuel cell stack according to claim 19, wherein said fuel cell is selected from the group consisting of solid oxide fuel cell, proton exchange membrane fuel cell, molten

carbonate fuel cell, phosphoric acid fuel cell, alkaline fuel cell, direct methanol fuel cell, regenerative fuel cell, zinc air fuel cell, and protonic ceramic fuel cell.

24. The fuel cell stack according to claim 19, wherein said fuel cell comprises a solid oxide fuel cell.

26. The fuel cell stack according to claim 19, wherein thermal coefficients of expansion of said fuel cell and said top and bottom walls are different.

30. The fuel cell stack according to claim 19, wherein said fuel cell stack comprises materials of different thermal coefficients of expansion.

31. The fuel cell stack according to claim 19, wherein said fuel cell comprises a ceramic material and each of said top wall and said bottom wall comprises a metal.

32. The fuel cell stack according to claim 19, wherein each of said top wall and said bottom wall are interconnects.

33. The fuel cell stack according to claim 19, wherein each of said top wall and said bottom wall of the hollow manifold acts as an anode interconnect.

34. The fuel cell stack according to claim 19, wherein the compliant structure is located adjacent to said fuel cell and said sealed passage.

35. The fuel cell stack according to claim 19, wherein the compliant structure comprises a corrugated structure.

IX. EVIDENCE APPENDIX

No evidence pursuant to 37 C.F.R. §§ 1.130, 1.131, or 1.132 is/are entered by the Examiner. Accordingly, no evidence is/are relied upon by the Appellant in this paper.

X. RELATED PROCEEDINGS APPENDIX

No related proceedings pursuant to 37 C.F.R. § 41.37(c)(1)(ii) is/are entered by, relied upon, or submitted by the Appellant with this paper.